



# STEVEN SEPVEST CORP

INDUSTRIAL LASER SOLUTIONS PROVIDER

## Aviation Industry

- **Overview**

With high efficiency, low consumption, short flow, high performance, digital and intelligent features, laser manufacturing technology has broad prospects in national defense, aviation and aerospace fields.

In view of the present situation, we will take advantages of laser manufacturing technology, change the present situation of aviation industry, and form a new generation of laser manufacturing industry chain eventually. As an industry leader, HGLASER is committed to providing a full set of processing production line in aviation industry, such as high power laser welding, high power laser cutting & drilling, laser surface treatment technology and low power laser micro processing series.

- **Our Solution**

### **High Power Laser Welding**

Widely used in airplanes, aluminum alloy is the main material of carrier rocket and spacecraft. By comparison of traditional welding and laser welding, the advantages of laser technology will be very visible.

Traditional Welding	Laser Welding
Low speed, high heat input and heat deformation; Decrease of ductility and toughness; Welding joints will produce air holes, cracks, and embrittlement.	Fast speed, small heat input and heat deformation; Small welding joints and structural distortion; Automation and precision control; Emergency stop and restart in fast-speed welding.

### **Laser Welding in Alloy Wallboard of Airplane**

Reasons of using filler wire welding: Aluminum and aluminum alloy have low intensity at high temperature, liquid aluminum has good flow performance, welding metal will cause collapse in welding.

Advantages: Low requirement about joint precision, high intensity.

The principle of material choice: The purity of pure aluminum welding wire is not less than or close to base metal. And the content of corrosion resistant elements (such as Mg, Mn, Si, etc) is not less than base metal. Heterogeneous aluminum welding should choose welding wire with high corrosion resistant and high intensity.



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## High Power Laser Cutting & Drilling

Laser cutting & drilling application is widely used in aviation industry.

- Many materials can be cut with laser in aviation industry, such as titanium alloys, nickel alloys, chromium alloys, aluminum alloys, beryllium oxide, stainless steels, plastics, etc;
- Laser cutting can be used in aircraft skin, honeycomb structure, frame, wing, empennage wallboard, main rotor of helicopter, engine crankcast, flame tube, etc;
- YAG and CO2 laser are often used in laser cutting, sometimes high repetition CO2 pulse laser.

## High power laser surface heat treatment

Laser Quenching	Laser Cladding
<p>Laser quenching utilizes high power laser to quickly scan workpiece surface and absorb energy, so as to reach high temperature and complete low temperature quenching instantly.</p> <p>High-speed heating and cooling, high hardness, short processing cycle, high efficiency, high automation and no pollution.</p>	<p>Laser cladding utilizes laser new technology to repair old equipment. It is a kind of remanufacturing and recycling engineering.</p> <p>Based on old equipment, laser cladding restores and enhances equipment utilization, so as to save resources, protect environment and achieve sustainable development. It is widely used in electricity, metallurgy, mechanical industry, etc.</p>

## • Customer Benefit

With laser technology, customers will benefit much:

- No molds: When the parts change, just change the program, which can greatly shorten the production preparation cycle and adapt to the trial requirements of small production volume, much variety and big change;
- No scribing: High processing and repeat precision, fast speed can improve production efficiency 8 to 20 times;
- Narrow cuts: 0.1—0.2mm, save 20%-25% materials;
- Save fixtures: No need rigid clamping in cutting, the workpieces are not affected by forces, can cut honeycomb



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structure and flexible deforming parts and realize automatic processing;

- Easy operation, energy conservation and environmental protection improve product quality and production efficiency;

- High reliability and strong stability meet the demands of mass industrial production.

- **Related Application**

### **Laser Welding in Aircraft Structural Parts**

Foreign large aircrafts adopt laser beam welding to replace rivet welding. Compared with traditional welding methods,

laser welding has high precision without solders, can save many rivets and energy consumption of each seat.

### **Wide Application of Laser Cutting in Foreign Aviation Industry**

1) Laser cutting technology saves time and materials;

2) An American company uses 500W CO2 laser to cut complex-shaped empennage wallboard;

3) Compared with chemical method, laser cutting can reduce working hours 58%;

4) An American aircraft company uses 500W CNC five coordinates CO2 laser cutting machine to cut large 3D aircraft parts. A British helicopter company uses CO2 laser machine to cut helicopter stainless steel main rotors.

Traditional method needs 35 minutes, but laser cutting only needs 1 minute and 40 seconds.





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## Laser Drilling of Aircraft Engine



Engine Firebox Surface Laser  
Drilling

## HGLASER Heat Treatment Application



Engine Forged Blade Laser  
Cladding

Before Laser Remanufacturing  
of Turbine Guide Blade

After Laser  
Remanufacturing of Turbine  
Guide Blade



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## Low Power Laser Micro Processing



Instrument Permanent Marking



Axletree Permanent Marking

## Aircraft Parts Seal Welding



Fiber Gyroscope Laser Seal Welding



Tantalum Capacitor Laser Seal  
Welding



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## Precision cutting & drilling of aviation and military parts



Aircraft Engine Leaf-shaped Hole



Transmitting Tube Graphite Grid

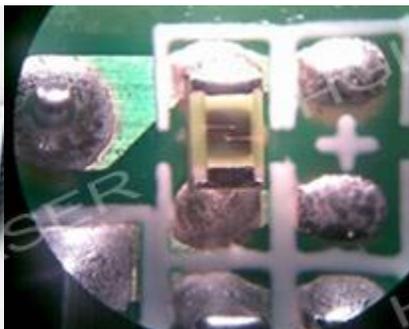


Laser Drilling

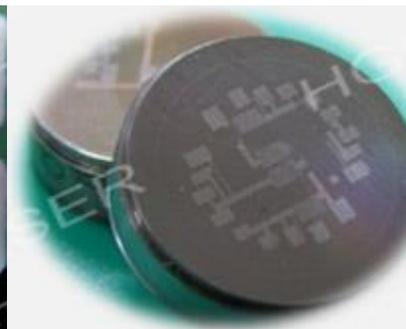
## Precision Laser Trimming of Aviation and Military Sensors



Online Trimming of Pressure Sensor



Laser Trimming Under a 200-Time Magnifier



Precision Trimming of Film Pressure Sensor